Mem. Qd Mus. (1971) **16**(1): 19–26, pl.1.

DASYURUS DUNMALLI, A NEW SPECIES OF FOSSIL MARSUPIAL (DASYURIDAE) IN THE UPPER CAINOZOIC DEPOSITS OF QUEENSLAND

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ABSTRACT

A new species of fossil marsupial native cat, *Dasyurus dunmalli*, is described from the Chinchilla Sand of possible Pliocene age, while further material derived from the Pleistocene fluviatile deposits of the eastern Darling Downs is referred to the extant *D. viverrinus* Shaw, 1800. The presence of *Dasyurus* is noted in the cave and fissure-fill deposits at Cement Mills, Gore.

Small dasyurids are poorly represented in collections of fossil marsupials from the Upper Cainozoic deposits of Queensland. A number are present however, which are referable to the genus *Dasyurus* Geoffroy. Lydekker (1887) recorded the presence of *D. viverrinus* Shaw from the Pleistocene fluviatile deposits of the Darling Downs area, southeastern Queensland, but no definitive study has been undertaken on the limited sample available. The present study was prompted by the recent discovery of additional material and the existence of previously unreported specimens in the collections of the Queensland Museum and is in keeping with a general study of the Upper Cainozoic faunas of Queensland. Although part of the sample is poorly localized, it is evident that the specimens have been derived both from the Chinchilla Sand of possible Pliocene age and from the Pleistocene fluviatile deposits. A single specimen has also been recovered from the Pleistocene cave and fissure-fill deposits at Cement Mills, Gore, southeastern Queensland.

Studies in recent years in the Diprotodontidae, Macropodidae and Phalangeridae have indicated that there are frequently, but not invariably (Bartholomai, 1967), taxonomic differences at the specific level between samples from the possibly Pliocene and Pleistocene deposits in the Darling Downs area and it was considered valuable to ascertain if any distinction exists within the genus *Dasyurus* of the Dasyuridae.

The author wishes to express his appreciation to Mr W. Dunmall of Dalby, southeastern Queensland, for the donation of recently collected specimens from Chinchilla to the Queensland Museum.

Family DASYURIDAE

Subfamily DASYURINAE

Genus **Dasyurus** Geoffroy

Dasyurus dunmalli sp. nov.

(Pl. 1, figs. 1–4)

MATERIAL: F6579, holotype, partial left mandibular ramus with base of C_1, P_1–P_3, M_1–M_3 with protoconid shattered in M_2 and M_3, adult, Chinchilla Sand at Chinchilla Rifle Range (Rifle Range number 78, Par. of Chinchilla), from side gully leading into middle gully system, Darling Downs, SE.Q.

F742, partial right mandibular ramus with C_1, alveoli for P_1–P_3, M_1–M_3, M_4 broken, adult, Darling Downs. F6580, partial left mandibular ramus with alveoli for P_2–P_3, M_1, Chinchilla Sand at Chinchilla Rifle Range, from side gully leading into middle gully system, Darling Downs.

DIAGNOSIS: This species is morphologically very similar to the living *Dasyurus viverrinus* Shaw but is distinguished by the presence of an additional, very small premolar immediately anterior to M_1. Although this tooth is readily lost, an alveolus is consistently present in specimens in which that portion of the ramus is preserved.

DESCRIPTION: Ramus shallow anteriorly, deepest below posterior molars. Symphysis elongate, relatively deep, ovate, extending posteriorly to below anterior root M_1; geniohyal pit shallow. Mental foramina usually positioned below P_2 and M_1 closer to ventral margin of ramus than dorsal; occasionally third foramen present below M_1–M_2.

Canine large with strongly upcurved root and recurved, piercing crown. Laterally, crown rounded, but lingual surface markedly angular anteriorly and posteriorly, with antero-lingual portion more strongly angular; mesially, lingual surface convex. Enamel margin raised higher antero-lingually than elsewhere around tooth, with slight basal cingulum present paralleling enamel margin.

$P_1 < P_2 > P_3$; all premolars basically similar morphologically, the major differences being in size and in the presence of only a single root in P_3 compared with a divided root in P_1 and P_2. First premolar relatively small, in close juxtaposition with postero-labial surface of C_1 and positioned with its anterior margin more anterior than posterior surface of the canine. Single high cuspid present, positioned above anterior moiety of crown; anterior ridge from cuspid relatively steep, but posterior ridge descends more gently to near horizontal posterior occlusal surface of tooth; slight basal cingulum present labially and lingually, strongest postero-labial and postero-lingual to cuspid. In occlusal view, crown moderately convex labially but only slightly convex or flattened lingually. P_2 morphologically similar to P_1 but cuspid positioned slightly more anteriorly. P_3 very small, more ovate in occlusal view, with basal cingulum well defined.

$M_1<M_2<M_3>M_4$; molars high crowned with sharp, generally distinct cuspids and well defined basins. Protoconid best developed, strong, generally widely separated from paraconid and united with this cuspid by strong, secant ridge; M_1 with paraconid reduced to slight cuspule towards base of anterior ridge from protoconid. Metaconid generally well defined, lower than protoconid, usually well separated from that cuspid; metaconid weak in M_1, positioned close to protoconid. Trigonid basin almost non-existent in M_1, but well developed in M_2–M_4. Hypoconid somewhat stronger than entoconid, but both cuspids low compared with protoconid; hypoconid connected to base of protoconid by relatively strong, secant ridge; similar ridge curves postero-lingually to unite usually with hypoconulid then to entoconid; hypoconulid very weak in M_1, becoming stronger posteriorly, but apparently absent or very weak in M_4; entoconid less distinctly united to base of metaconid. Talonid basin low, well defined. Slight antero-labial cingulum ascends from below protoconid to below paraconid; usually less well defined antero-lingual cingulum present. Posterior cingulum slight.

TABLE 1

MEASUREMENTS (mm) FOR *Dasyurus dunmalli* SP. NOV.

Specimen	P_1	P_2	P_3	M_1	M_2	M_3	M_4
F6579*	3.4×1.9	3.8×2.1	1.8×1.5	4.8×2.6	5.7×3.0	6.1×3.6	—
F740	3.5×1.8	4.1×2.0	—	4.4×2.3	5.1×2.8	5.5×3.2	—
F741†	—	—	—	—	—	5.2× —	4.9×2.6

* holotype † Doubtfully referred to *D. dunmalli*.

DISCUSSION: Dasyurines are poorly represented as fossils in collections from the Upper Cainozoic deposits of Queensland. Smaller forms are particularly poorly known, but larger forms are comparatively better represented. Two species of *Sarcophilus* Geoffroy and Cuvier have been recorded from Queensland, *S. laniarius* Owen, originally described from the Wellington Caves, New South Wales (Owen, 1838) and locally present in Pleistocene fluviatile and cave deposits and *S. prior* de Vis, 1884, based on the proximal articular surface of a right tibia with portion of the shaft, from the Chinchilla Sand at Chinchilla. The smaller dasyurine, *Dasyurus viverrinus* Shaw has been recorded from Gowrie, Darling Downs by Lydekker (1887), but at that time was known only from a single mandibular fragment, British Museum (Natural History) specimen number M1906. Longman (1925) indicated the presence of *Antechinus flavipes* Thomas in the Pleistocene cave earth deposits at Marmor, mid eastern Queensland.

TABLE 2

MEASUREMENTS (mm) FOR *Dasyurus viverrinus* SHAW (FOSSIL SAMPLE)

Specimen	P_1	P_2	M_1	M_2	M_3	M_4
F737	—	—	—	4.8×2.6	5.4×2.9	5.5×2.9
F738	—	—	—	—	5.8×3.0	5.6×2.8
F739	3.8×1.4	3.9×1.7	4.9×2.4	5.6×2.8	5.8×3.0	5.4×3.0

D. dunmalli sp. nov. is currently known only from fragmentary mandibular rami and as yet, no maxillary specimens referable to the genus *Dasyurus* Geoffroy have been recovered from the Upper Cainozoic deposits of Queensland. Although only portion of the sample referred to *D. dunmalli* is accompanied by locality information more specific than 'Darling Downs' preservation of the remaining specimens is typical of derivation from the Chinchilla Sand of possible Pliocene age (Woods, 1956). It is thus highly likely that the species is restricted to that Formation.

One aged specimen, F741, a partial left mandibular ramus with M_2–M_4, from the Chinchilla Sand at Chinchilla has been doubtfully referred to *D. dunmalli*. This specimen does not present that portion of the ramus containing the diagnostic feature of the species. Measurements for this ramus are included in table 1.

In addition to the material described as *D. dunmalli*, there exists in the collections of the Queensland Museum, a series of mandibular fragments numbered F736–9 inclusive which are morphologically identical with the living *D. viverrinus*. Again, the specimens generally possess limited locality information with the exception of F736, from Clifton, Darling Downs. The remainder all have preservation consistent with their derivation from the Pleistocene fluviatile deposits of the eastern Darling Downs. A single mandibular fragment, F3703, referable to the genus *Dasyurus* has been recovered from the cave and fissure-fill deposits at Cement Mills, Gore, southeastern Queensland. Although this specimen lacks teeth, the proportions of the ramus and its morphology suggest that it also is most likely of *D. viverrinus*. Measurements for the series of specimens from the Pleistocene fluviatile deposits are presented in table 2, while table 3 presents for comparison, mandibular measurements from a recent sample of *D. viverrinus*.

Apart from the presence of the minute additional third premolar, or its alveolus, in all specimens of *D. dunmalli* in which that portion of the ramus has been preserved, no other consistent morphological differences are evident between this species and the fossil and recent samples of *D. viverrinus*. The proportions of the first and second premolars are

TABLE 3

MEASUREMENTS (mm) FOR *Dasyurus viverrinus* SHAW (RECENT SAMPLE)

Specimen	Sex	P_1	P_2	M_1	M_2	M_3	M_4
J17769	♂	4.1×1.5	4.6×1.9	5.4×2.4	5.8×3.0	5.7×3.1	6.0×3.0
J7996	♂	3.9×1.4	4.3×1.7	5.0×2.3	5.5×2.8	5.7×3.2	5.7×3.1
J8787	♂	4.0×1.5	4.3×1.5	4.6×2.3	5.5×2.8	5.7×3.0	5.6×3.0
J20313	♂	4.0×1.7	4.5×1.9	4.9×2.4	5.3×3.1	5.7×3.0	5.7×3.1
J20414	—	3.7×1.7	4.2×1.8	4.7×2.4	5.6×2.8	5.8×3.1	5.4×2.9
J20413	—	4.1×1.7	4.2×1.8	4.8×2.3	5.8×2.9	5.8×3.3	—
J20379	♂	3.6×1.4	3.9×1.5	4.4×2.2	5.3×2.5	5.6×2.7	5.2×2.4
J20380	♀	3.7×1.3	4.0×1.6	4.6×2.2	5.0×2.6	5.2×2.8	5.0×2.6
J20381	—	4.2×1.5	4.3×1.6	5.0×2.2	5.7×2.8	6.0×3.0	5.6×2.6
J20382	♀	4.0×1.5	4.2×1.6	4.7×2.4	5.1×2.9	5.6×3.1	5.5×2.8
J20383	—	3.6×1.4	4.0×1.5	4.2×2.2	4.8×2.4	5.3×2.7	5.0×2.5

somewhat different but the sample of *D. dunmalli* is too small to ascertain whether this difference can be accommodated by normal variation within the species. Comparison of the tables of measurements indicates that in other metrical features, differences are negligable. Unlike many of the Pleistocene forms, gigantism was not a feature of *Dasyurus*.

Two Quaternary fossil species of *Dayurus* are known from elsewhere in Australia; *D. affinis* McCoy, defined by McCoy (?1862) from Victoria, and *D. bowlingi* Spencer and Kershaw from King and Deal Islands, Bass Strait (Spencer and Kershaw, 1910). The syntypes of *D. affinis* have been figured by Gill (1953) and lack any trace of the presence of P_3. The species appears to be morphologically close to *D. maculatus*, but Ride (1964) suggests that while it is nearly as large as the living species, it differs in its proportions. Spencer and Kershaw (1910) provide adequate information to show that *D. bowlingi* is larger than *D. maculatus* and morphologically distinct. Size considerations alone serve to distinguish both southern fossil species from *D. dunmalli* and the fossil specimens of *D. viverrinus*.

That fossil representatives of the genus *Dasyurus* should be found containing reduced third premolars is not surprising when the dental characteristics of the family as a whole are considered. In fact, complete loss of P_3 is relatively rare in living members of the family, as shown by Tate (1947). He indicates that this condition is found only within *Dasyuroides* Spencer, *Dasycercus* Peters, *Myoictis melas* (Müller and Schlegel), *Pseudantechinus* Tate, *Dasyurus* (including *Dasyurops* Matschie, *Dasyurinus* Matschie and *Satanellus* Pocock; see Ride, 1964, and Simpson, 1945) and *Sarcophilus*. The majority of living dasyurids trend towards reduction of P_3, with strongest development in P_2. Relatively few forms retain P_3 in its normal, 'primitive' condition, larger than P_2.

Tate (1947) suggests that reduction and loss of P_3 (P_4 in Tate) is evidence of specialisation. This suggestion follows that of Thomas (1887) and Bensley (1903). On the basis of comparison with other dasyurids in which P_3 is vestigial, it appears likely that when maxillary remains of *D. dunmalli* are located the third upper premolar may be more strongly developed.

The species *Glaucodon ballaratensis* Stirton, 1957, from the Pliocene of Victoria, has been suggested by Ride (1964) to be structurally ancestral to *Sarcophilus*. It nevertheless possesses some characters which Ride interprets as suggesting a more remote relationship with *Dasyurus*. The presence of *D. dunmalli* in possibly Pliocene sediments, a form which is only slightly more 'primitive' than living *Dasyurus* supports Ride's conclusions on the relationships within the group. Although no definite information is available on earlier representatives of the *Dasyurus* line, it appears likely that their ancestry must have been at least as early as the Middle Tertiary on the basis of the apparent stage of evolution of *D. dunmalli*. An early dasyuroid fossil has been recorded by Stirton *et al.* (1961) from the possibly Oligocene Etadunna Formation of the Lake Eyre Basin. However, in the absence of additional information on its morphology, no purpose can be served by further speculation on the relationships of this form to support or reject Ride's (1964) treatment of it within the Thylacinidae.

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PLATE 1

Dasyurus dunmalli sp. nov.

FIG. 1: Lateral view of holotype, F6579, Chinchilla Rifle Range (Rifle Range No. 78, Par. of Chinchilla), SE.Q., ×2.

FIG. 2: Stereopair of F6579, ×2.

FIG. 3: Stereopair of F742, Darling Downs, SE.Q., ×2.

FIG. 4: Lateral view of F742, ×2.